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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/775,935	02/10/2004	Takeshi Nogami	09792909-5802	3159

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EXAMINER

VAN, LUAN V

ART UNIT	PAPER NUMBER
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1753

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/23/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/775,935

Applicant(s)

NOGAMI ET AL.

Examiner

Luan V. Van

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 March 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-7 and 9-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-7 and 9-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on March 19, 2007 has been entered.

Response to Amendment

Applicant's amendment of March 19, 2007 does not render the application allowable.

Status of Objections and Rejections

The rejection of claim 5 under 35 USC 103(a) as being unpatentable over Ting et al. is withdrawn in view of applicant's amendment.

All other rejections from the previous office action are maintained.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

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(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 2-5 are rejected under 35 U.S.C. 102(e) as being anticipated by Ting et al.

Regarding claims 2 and 4, Ting et al. teach a semiconductor manufacturing apparatus comprising: an electrolytic plating chamber 10 (Figs. 1-2) with which an electrolytic plating apparatus responsible for electrolytic plating of a substrate is constructed; an electrolytic polishing chamber 10 (the additional electrolytic plating chamber can be used as a polishing chamber, Figs. 1-2, column 4, lines 18-31) with which an electrolytic polishing apparatus responsible for electrolytic polishing of the substrate is constructed; and a conveying chamber 51 (Fig. 12) having installed therein a conveying instrument responsible for loading/unloading (column 17, lines 9-13) of the substrate to or from said electrolytic plating chamber and to or from said electrolytic polishing chamber, and being connected respectively to said electrolytic plating chamber and said electrolytic polishing chamber, wherein the electrolytic plating and/or polishing chamber with which the electrolytic plating and/or polishing apparatus is constructed comprises: a holder 13 (Figs. 2-3) for holding the substrate; and a cup 12 (Figs. 2, 4-9) provided so as to oppose to said holder and is capable of forming a closed space, into which an electrolytic plating solution can be filled, together with the substrate held by said holder.

Any of the manifolds 18-20, i.e. nozzles, of Ting et al. as seen in Fig. 5 broadly reads on the nozzle of the instant claim. The manifolds are also provided outside of cup 12 and are structurally capable of supplying a process liquid onto the surface of the substrate held by said holder.

Regarding claim 3, the apparatus of Ting et al. is structurally capable of supplying a cleaning liquid.

Regarding claim 5, Ting et al. teach manifolds 18-20 (Fig. 5), which are structurally capable of supplying a cleaning liquid or etching solution onto the surface of the substrate.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 6, 7 and 9-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ting et al. in view of Maydan et al.

Regarding claim 6, Ting et al. teach a semiconductor manufacturing apparatus comprising: an electrolytic plating chamber 49 (Fig. 12) with which an electrolytic plating apparatus responsible for electrolytic plating of a substrate is constructed; an electrolytic polishing chamber 49 with which an electrolytic polishing apparatus responsible for electrolytic polishing of the substrate is constructed; an electroless plating chamber 49 (the plating chamber of Ting et al. is structurally capable of being used as an electroless plating chamber in the absence of an applied current) with which an electroless plating apparatus responsible for electroless plating of the substrate is constructed; and a conveying chamber 51 having installed therein a conveying instrument responsible for loading/unloading of the substrate to or from said electrolytic plating chamber, to or from said electrolytic polishing chamber, to or from said electroless plating chamber, and being connected respectively to said electrolytic plating chamber, said electrolytic polishing chamber, and said electroless plating chamber, and said conveying chamber being connected with a liquid treatment chamber for supplying a process liquid, wherein said liquid treatment chamber comprises a holder for holding the substrate, and a nozzle for supplying the process liquid onto a surface of the substrate held by said holder. The additional plating chamber would read on the liquid treatment chamber of the instant claim.

Any of the manifolds 18-20, i.e. nozzles, of Ting et al. as seen in Fig. 5 broadly reads on the nozzle of the instant claim. The manifolds are also provided outside of cup

12 and are structurally capable of supplying a process liquid onto the surface of the substrate held by said holder.

Ting et al. differ from the instant claims in that the reference does not explicitly teach an annealing chamber.

Maydan et al. teach an apparatus comprising an annealing chamber 211 (Fig. 1).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the apparatus of Ting et al. by using the annealing chamber of Maydan et al., because an annealing chamber is typically utilized in substrate processing systems to enhance the properties of the deposited materials by recrystallization of the deposited films, such as copper films, which can cause the flow of the deposited material to fill voids formed in features, purify layers of contaminants, such as oxygen, encourage diffusion of dopants, such as phosphorus, in the deposited materials, and manage crystal growth and orientation to control film properties (column 7, lines 49-61 of Maydan et al.)

Regarding claim 7, Ting et al. teach said conveying instrument is responsible for loading/unloading of the substrate to or from said electrolytic plating chamber, to or from said electrolytic polishing chamber, to or from said electroless plating chamber, and is also responsible for loading/unloading of the substrate to or from said liquid treatment chamber (column 17, lines 3-34).

Regarding claims 9 and 13, Ting et al. teach manifolds 18-20 (Fig. 5), which are structurally capable of supplying a cleaning liquid or etching solution onto the surface of the substrate.

Regarding claims 10 and 12, Ting et al. teach the electrolytic plating or polishing chamber with which the electrolytic plating or polishing apparatus is constructed comprises: a holder 13 (Figs. 2-3) for holding the substrate; a cup 12 (Figs. 2, 4-9) provided so as to oppose to said holder and is capable of forming a closed space, into which an electrolytic plating solution can be filled, together with the substrate held by said holder; and a nozzle 18 (Figs. 5-6) for supplying a process liquid onto a surface of the substrate held by said holder.

Regarding claim 11, the apparatus of Ting et al. is structurally capable of operating with a cleaning liquid.

Claims 2-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ting et al. in view of Cheung et al. (US patent 6136163), assuming the supplied liquid of manifolds 18-20 of Ting et al. does not reach the surface of the substrate.

Ting et al. teach the apparatus as described above. Any of the manifolds 18-20 of Ting et al. as seen in Fig. 5 broadly reads on the nozzle of the instant claim. The manifolds are also provided outside of cup 12.

Ting et al. differ from the instant claims in that the reference does not explicitly disclose whether the liquid is supplied onto the surface of the substrate.

Cheung et al. teach an electroplating apparatus comprising a spin-rinse-dry module having nozzles placed above the substrate and outside of the diameter of the substrate to lessen the risk of the nozzles dripping on the substrate (column 5 line 66 -- column 6 line 1).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the apparatus of Ting et al. by positioning the nozzle such that it would supply liquid onto the surface of the substrate as taught by Cheung et al., because it would be able to clean the surface of the substrate, and because it would lessen the risk of the nozzles dripping on the substrate (column 5 line 66 -- column 6 line 1 of Cheung et al.).

Claims 6, 7 and 9-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ting et al. in view of Cheung et al. and Maydan et al., assuming the supplied liquid of manifolds 18-20 of Ting et al. does not reach the surface of the substrate.

Regarding claim 6, Ting et al. teach a semiconductor manufacturing apparatus comprising: an electrolytic plating chamber 49 (Fig. 12) with which an electrolytic plating apparatus responsible for electrolytic plating of a substrate is constructed; an electrolytic polishing chamber 49 with which an electrolytic polishing apparatus responsible for electrolytic polishing of the substrate is constructed; an electroless plating chamber 49 (the plating chamber of Ting et al. is structurally capable of being used as an electroless plating chamber in the absence of an applied current) with which an electroless plating apparatus responsible for electroless plating of the substrate is constructed; and a conveying chamber 51 having installed therein a conveying instrument responsible for loading/unloading of the substrate to or from said electrolytic plating chamber, to or from said electrolytic polishing chamber, to or from said electroless plating chamber, and being connected respectively to said electrolytic plating chamber, said electrolytic

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polishing chamber, and said electroless plating chamber, and said conveying chamber being connected with a liquid treatment chamber for supplying a process liquid, wherein said liquid treatment chamber comprises a holder for holding the substrate, and a nozzle for supplying the process liquid onto a surface of the substrate held by said holder. The additional plating chamber would read on the liquid treatment chamber of the instant claim.

Ting et al. differ from the instant claims in that the reference does not explicitly teach an annealing chamber. Ting et al. also differ from the instant claims in that the reference does not explicitly disclose whether the liquid is supplied onto the surface of the substrate.

Cheung et al. teach an electroplating apparatus comprising a spin-rinse-dry module having nozzles placed above the substrate and outside of the diameter of the substrate to lessen the risk of the nozzles dripping on the substrate (column 5 line 66 -- column 6 line 1).

Maydan et al. teach an apparatus comprising an annealing chamber 211 (Fig. 1).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the apparatus of Ting et al. by positioning the nozzle such that it would supply liquid onto the surface of the substrate as taught by Cheung et al., because it would be able to clean the surface of the substrate, and because it would lessen the risk of the nozzles dripping on the substrate (column 5 line 66 -- column 6 line 1 of Cheung et al.).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the apparatus of Ting et al. by using the annealing chamber of Maydan et al., because an annealing chamber is typically utilized in substrate processing systems to enhance the properties of the deposited materials by recrystallization of the deposited films, such as copper films, which can cause the flow of the deposited material to fill voids formed in features, purify layers of contaminants, such as oxygen, encourage diffusion of dopants, such as phosphorus, in the deposited materials, and manage crystal growth and orientation to control film properties (column 7, lines 49-61 of Maydan et al.)

Regarding claim 7, Ting et al. teach said conveying instrument is responsible for loading/unloading of the substrate to or from said electrolytic plating chamber, to or from said electrolytic polishing chamber, to or from said electroless plating chamber, and is also responsible for loading/unloading of the substrate to or from said liquid treatment chamber (column 17, lines 3-34).

Regarding claims 9 and 13, Ting et al. teach manifolds 18-20 (Fig. 5), which are structurally capable of supplying a cleaning liquid or etching solution onto the surface of the substrate.

Regarding claims 10 and 12, Ting et al. teach the electrolytic plating or polishing chamber with which the electrolytic plating or polishing apparatus is constructed comprises: a holder 13 (Figs. 2-3) for holding the substrate; a cup 12 (Figs. 2, 4-9) provided so as to oppose to said holder and is capable of forming a closed space, into which an electrolytic plating solution can be filled, together with the substrate held by

said holder; and a nozzle 18 (Figs. 5-6) for supplying a process liquid onto a surface of the substrate held by said holder.

Regarding claim 11, the apparatus of Ting et al. is structurally capable of operating with a cleaning liquid.

Response to Arguments

In the arguments presented on page 7 of the amendment, the applicant argues that Ting et al. fails to teach a nozzle provided outside of said cup for supplying a process liquid onto a surface of a substrate held by a holder. The examiner respectfully disagrees. As described above, any of the manifolds 18-20, i.e. nozzles, of Ting et al. as seen in Fig. 5 broadly reads on the nozzle of the instant claim. The manifolds are also provided outside of cup 12 and are structurally capable of supplying a process liquid onto the surface of the substrate held by said holder, because liquid is sprayed in the chamber when the wafer support 13 is in the lower position, thus exposing the surface of the wafer to the cleaning liquid. Furthermore, even assuming the supplied liquid does not reach the surface of the substrate, Cheung et al. teach positioning the nozzles above the substrate and outside the diameter of the substrate in order to lessen the risk of the nozzles dripping on the substrate. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the apparatus of Ting et al. by positioning the nozzle such that it would supply liquid onto the surface of the substrate as taught by Cheung et al., because it would be

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able to clean the surface of the substrate, and because it would lessen the risk of the nozzles dripping on the substrate (column 5 line 66 -- column 6 line 1 of Cheung et al.).

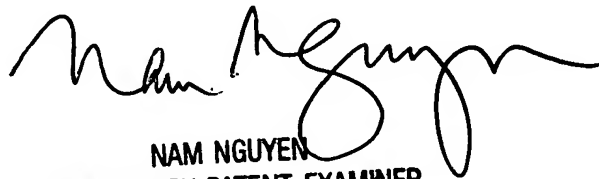
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luan V. Van whose telephone number is 571-272-8521. The examiner can normally be reached on M-F 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LWV
April 18, 2007


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SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700